

PATENT APPLICATION

*IN THE UNITED STATES PATENT AND TRADEMARK OFFICE*

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*Attorney*  
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*Applicant:* Naoto Ohashi et al.  
  
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PRELIMINARY AMENDMENT

Box: Patent Application  
Assistant Commissioner for Patents  
Washington, DC 20231

Sir:

Prior to the examination of the above-identified application, please amend the application  
as follows:

IN THE SPECIFICATION

Please replace the first full paragraph on page 3 with the following:

- It is an object of this invention to provide an air permeable disposable diaper  
comprising a cover member adapted to cover front and rear waist regions as well as a crotch  
region of a wearer's body of the diaper and an absorbent member adapted to be attached to an  
inner side of this cover member.- -

Please replace the paragraph beginning on page 8 and continuing on page 9 with the  
following:

- -Now referring to Fig. 4 showing the diaper 1 in the sectional view taken along the line IV – IV extending aside toward the rear waist region 7 with respect to the line III – III dividing the diaper 1 into front and rear sections as viewed in the longitudinal direction as indicated in Fig. 2, the absorbent member 3 is formed on the side of the backsheet 37 with a pair of the first grooves 41 (See Fig. 5) concaved toward the topsheet 36 and longitudinally extending toward the front and rear end portions 26, 27. Each of the first grooves 41 preferably has a width of about 2 - 20 mm and a depth corresponding to about 1/4 - 3/4 of the thickness of the core 38, and has its inner side with the backsheet 37. The core 38 is disposed between the backsheet 37 defining the inner side of the respective first grooves 41 and the topsheet 36 opposed to the backsheet 36. The first grooves 41 are intended to maintain, between the absorbent member 3 and the cover member 2, clearances serving to improve permeability of the diaper 1 even when these members 2, 3 are brought into a close contact.- -

Please replace the first full paragraph on page 10 with the following:

- -Referring to Fig. 6 showing the diaper 1 in the sectional view taken along the line VI – VI extending between the front and rear end portions 18, 19 of the cover member 2 as indicated in Fig. 2, each of the first grooves 41 is laid separated respectively in the crotch region 8 in the longitudinal direction by an appropriate spacing. If necessary, it is also possible to make all of the first grooves 41 connected entirely, rather than laying separately the respective first grooves 41 in the longitudinal direction. It should be understood here that, while the leak-barrier cuffs 31 are normally folded down onto the topsheet 36, these leak-barrier cuffs 31 are illustrated in Fig. 6 as being somewhat rising in order that the presence of these leak-barrier cuffs 31 can be apparently recognized.- -

Please replace the last paragraph beginning on page 10 and continuing on page 11 with the following:

- -While the diaper 1 of such a structure is worn, the cover member 2 and the absorbent member 3 are maintained to be spaced from each other along the first grooves 41 even when these members 2, 3 are brought into a close contact with each other and thereby air permeability between the interior and the exterior of the absorbent member 3 can be improved. For example, an air permeable and liquid-impervious sheet may be used as a stock material for the backsheet 37 of the absorbent member 3 to ensure that a flow of air high in temperature and humidity can be guided from the interior of the core 38 through the backsheet 37 into the first grooves 41 and freely moved therein without being hindered the cover member 2. With the inner and outer sheets 16, 17 of the cover member 2 being air permeable, a flow of air high in temperature and humidity introduced into the first grooves 41 can be exhausted therefrom into the exterior of the diaper 1.- -

Please replace the first full paragraph on page 11 with the following:

- -Fig. 7 is a view similar to Fig. 4 but showing another embodiment of this invention. The absorbent member 3 of this diaper 1 is formed with, in addition to the first grooves 41 extending in the longitudinal direction, a pair of second grooves 46 extending in the transverse direction, i.e., orthogonally to the first grooves 41, between the transversely opposite side edge portions 29 of the absorbent member 3. These second grooves 46 facilitate the flow of air high in temperature and humidity to be exhausted from the first grooves 41 and thereby the air permeability of the absorbent member 3 is further improved. Preferably, one or more pieces of the second grooves 46 with substantially the same dimension as the first grooves 41 in width and depth may be installed against one piece of the first grooves 41.- -

Please replace the last paragraph beginning on page 11, continuing on page 12 and ending on page 13 with the following:

- Fig. 8 is a view similar to Fig. 2 but showing still another embodiment of this invention, Fig. 9 is a sectional view taken along a line IX - IX in Fig. 2 and Fig. 10 is an enlarged sectional view showing a part of Fig. 9. The diaper 1 shown in Figs. 8 - 10 has, in addition to the first grooves 41 or both the first and second grooves 41, 46 formed on the side of the backsheet 36, third grooves 47 formed on the side of the topsheet 36 so as to extend in the longitudinal direction. Preferably, the absorbent member 3 is formed on the side of the topsheet 36 with at least one portion of the third grooves 47 having an appropriate length and more preferably with at least two portions of the third grooves 47 each being spaced in the longitudinal direction in the crotch region 8 of the cover member 2. Referring to Fig. 8, the absorbent member 3 is formed along each of its transversely opposite side edge portions 29 with a pair of the third grooves 47 spaced from each other in the longitudinal direction. Taking account of the fact that the presence of the third grooves 47 tends to, in the same manner as the first grooves 41 in the embodiment shown by Fig. 4, restrain the absorbent member 3 from being easily curved between the front and rear end portions 26, 27, it is preferred to separate each of the third grooves 47 in the crotch region 8 so that the absorbent member 3 may be easily curved and thereby facilitated to fit to the wearer's crotch region. Each of the third grooves 47 preferably has a width of about 2 - 20 mm and a depth corresponding to about 1/4 - 3/4 of the thickness of the core 38. The third grooves 47 formed in this manner can reduce an amount of body fluids permeated sideways and prevent body fluids from leaking sideways of the diaper 1 by introducing body fluids such as urine to be guided thereinto.- -

Please replace the paragraph beginning on page 13 and continuing on page 14 with the following:

- -As is apparent from Fig. 10 showing the diaper 1 in the enlarged sectional view, the position of the third grooves 47 substantially conforms to the position of the first grooves 41 as viewed in the transverse direction of the diaper 1. With the first and third grooves 41, 47 formed on the side of the backsheet 37 and the side of the topsheet 36, respectively, in such an alignment, the absorbent member 3 is curved as indicated by imaginary lines and facilitated to follow a contour of the wearer's waist as the diaper 1 is worn. The first grooves 41 are deformed with their widths are widened and the third grooves 47 are deformed with their widths are narrowed as the absorbent member 3 follows the contour of the wearer's waist in the waist-surrounding direction. Such deformation of the grooves 41, 47 advantageously facilitates the absorbent member 3 to follow the contour of the wearer's waist without formation of wrinkles on the side of the topsheet 36 even if the core 38 has a thickness of about 10 - 20 mm. Therefore, there is no anxiety that the presence of the topsheet 36 might give the wearer an uncomfortable feeling. In this way, the first grooves 41 serving to improve the air permeability of the absorbent member 3 are preferably positioned to that of the third grooves 47 so that the fitness of the absorbent member 3 around the wearer's waist also may be improved. More specifically, with the arrangement that the first grooves 41 and the third grooves 47 are positioned on the same position as illustrated in Fig. 10, it is preferred to dispose the core 38 between the first and third grooves 41, 47 so that the body fluids can be dispersed in the absorbent member 3 in the transverse direction through the core 38.- -

Please replace the paragraph beginning on page 14 and continuing on page 15 with the following:

- -While this invention has been described hereinabove with respect to the pants-type disposable diaper as the typical embodiment thereof, this invention is applicable also to an open-type disposable diaper. The cover member 2 may be formed from a nonwoven fabric or plastic

film. The core 38 of the absorbent member 3 may be formed from fluff pulp fibers 61 and superabsorbent polymer particles 62. The superabsorbent polymer particles 62 may be mixed with the fluff pulp fibers 61 and this mixture may be layered in the thickness direction of the core 38. The superabsorbent polymer particles 62 may be distributed with its density gradually increasing in the direction from the topsheet 36 toward the backsheet 37. The distribution density of the superabsorbent polymer particles 62 may be varied in the transverse direction of the absorbent member 3. For example, referring to Fig. 8, the distribution density of the superabsorbent polymer particles 62 may be adjusted to be higher in the zone defined between a pair of the third grooves 47, 47 than in the zones extending outside the pair of the third grooves 47, 47. In any case, an amount of the superabsorbent polymer particles 62 used to form the core 38 is preferably about 2 - 98 % by weight of the core 38. Thermoplastic synthetic fiber having a melting point of  $100 \pm 20$  may be mixed into the core material up to 20 % by weight to facilitate formation of the first - third grooves 41, 46, 47 by heating the core 38 under a pressure.-

Please replace the first full paragraph on page 15 with the following:

- -The disposable diaper according to this invention has the first grooves and the second grooves formed on the side of the backsheet of the absorbent member which is attached to the inner side of the cover member. The grooves contribute to improvement of air permeability of the absorbent member itself as well as to the air permeability desired between this absorbent member and the cover member so that no stuffiness may occur even when the absorbent member is closely contacted with the wearer's skin.- -

## IN THE CLAIMS

Please amend Claim 1 as follows:

1. (Amended) A disposable diaper comprising:  
  
a cover member having front and rear waist regions and a crotch region; and  
  
a body fluid absorbent member attached to an inner side of said cover member;  
  
said body fluid absorbent member extending in a longitudinal direction across said crotch region into said front and rear waist regions, said body fluid absorbent member having front and rear end portions that are fixed to the inner surface of said cover member at said front and rear end portions thereof,  
  
said body fluid absorbent member including a liquid-pervious topsheet to be placed against a wearer's body, a backsheet to be placed against said inner surface of said cover member, and a body fluid absorbent core disposed between the liquid-pervious topsheet and said backsheet, said body fluid absorbent member being formed on a side facing said backsheet with at least one groove that is concaved in a direction from said backsheet toward said topsheet.

Please amend Claim 2 as follows:

2. (Amended) A disposable diaper according to claim 1, wherein said at least one groove extends in at least one of said longitudinal direction of said diaper and a direction orthogonal to said longitudinal direction.

Please amend Claim 3 as follows:

3. (Amended) The disposable diaper according to Claim 1, wherein said at least one groove comprises at least one first groove extending in said longitudinal direction across said crotch region into said front and rear waist regions and at least one second groove extending in a direction orthogonal to the longitudinal direction so that said at least one first groove and said

at least one second groove intersect one another and said at least one second groove extends to transversely opposite side edge portions of said body fluid absorbent member.

Please amend Claim 4 as follows:

4. (Amended) The disposable diaper according to Claim 1, wherein said body fluid absorbent member is formed on a side facing said topsheet with at least one third groove that is concaved in a direction from said topsheet toward said backsheet and extends in said longitudinal direction across said crotch region into said front and rear trunk regions.

Please amend Claim 5 as follows:

5. (Amended) The disposable diaper according to Claim 4, wherein said at least one third groove is positioned to be substantially aligned said at least one groove.

Please amend Claim 6 as follows:

6. (Amended) The disposable diaper according to Claim 3, wherein said body absorbent core is disposed between said backsheet formed with said at least one first groove and said at least one second groove and the topsheet opposed to said backsheet.

Please amend Claim 7 as follows:

7. (Amended) The disposable diaper according to Claim 4, wherein said body absorbent core is disposed between said topsheet formed with said at least one third groove and the backsheet opposed to said topsheet.

#### IN THE ABSTRACT

Please amend the Abstract as follows:



- -The disposable diaper that includes a cover member and a body fluid absorbent member attached to an inner side of the cover member. The absorbent member is composed of a liquid-pervious topsheet, a backsheet and an absorbent core disposed therebetween. The core is formed on a side of the backsheet with at least one first groove concaved in a direction from the backsheet toward the topsheet.- -

• • • R E M A R K S • • •

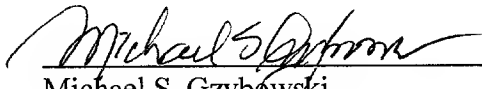
By the present Preliminary Amendment, the specification, claims and abstract have been revised to more clearly describe applicants' invention in accordance with the requirements of 35 U.S.C. § 112.

Care has been taken so as to avoid the addition of new matter in the specification, claims and abstract.

Entry of the present Preliminary Amendment prior to the examination of the application is respectfully requested.

In the event applicants have overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, applicants hereby petition therefor and authorize that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

Respectfully submitted,

  
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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

### Changes Made to Specification Paragraphs

The first full paragraph on page 3 has been amended as follows:

It is an object of this invention to provide [an improved air permeability to a] an air permeable disposable diaper comprising a cover member adapted to cover front and rear waist regions as well as a crotch region of a wearer's body of the diaper and an absorbent member adapted to be attached to an inner side of this cover member.

The paragraph beginning on page 8 and continuing on page 9 has been amended as follows:

Now referring to Fig. 4 showing the diaper 1 in the sectional view taken along the line IV - IV extending aside toward the rear waist region 7 with respect to the line III - III dividing the diaper 1 into front and rear sections as viewed in the longitudinal direction as indicated in Fig. 2, the absorbent member 3 is formed on the side of the backsheet 37 with a pair of the first [groove] grooves 41 (See Fig. 5) concaved toward the topsheet 36 and longitudinally extending toward the front and rear end portions 26, 27. Each of the first [groove] grooves 41 preferably has a width of about 2 - 20 mm and a depth corresponding to about 1/4 - 3/4 of the thickness of the core 38, and has its inner side with the backsheet 37. The core 38 is disposed between the backsheet 37 defining the inner side of the respective first [groove] grooves 41 and the topsheet 36 opposed to the backsheet 36. The first [groove] grooves 41 [is] are intended to maintain, between the absorbent member 3 and the cover member 2, clearances serving to improve permeability of the diaper 1 even when these members 2, 3 are brought into a close contact.

The first full paragraph on page 10 has been amended as follows:

Referring to Fig. 6 showing the diaper 1 in the sectional view taken along the line VI

- VI extending between the front and rear end portions 18, 19 of the cover member 2 as indicated in Fig. 2, each of the first [groove] grooves 41 is laid separated respectively in the crotch region 8 in the longitudinal direction by an appropriate spacing. If necessary, it is also possible to make all of the first [groove] grooves 41 connected entirely, rather than laying separately the respective first [groove] grooves 41 in the longitudinal direction. It should be understood here that, while the leak-barrier cuffs 31 are normally folded down onto the topsheet 36, these leak-barrier cuffs 31 are illustrated in Fig. 6 as being somewhat rising in order that the presence of these leak-barrier cuffs 31 can be apparently recognized.

The last paragraph beginning on page 10 and continuing on page 11 has been amended as follows:

While the diaper 1 of such a structure is worn, the cover member 2 and the absorbent member 3 are maintained to be spaced from each other along the first [groove] grooves 41 even when these members 2, 3 are brought into a close contact with each other and thereby air permeability between the interior and the exterior of the absorbent member 3 can be improved. For example, an air permeable and liquid-impervious sheet may be used as a stock material for the backsheet 37 of the absorbent member 3 to ensure that a flow of air high in temperature and humidity can be guided from the interior of the core 38 through the backsheet 37 into the first [groove] grooves 41 and freely moved therein without being hindered the cover member 2. With the inner and outer sheets 16, 17 of the cover member 2 being air permeable, a flow of air high in temperature and humidity introduced into the first [groove] grooves 41 can be exhausted therefrom into the exterior of the diaper 1.

The first full paragraph on page 11 has been amended as follows:

Fig. 7 is a view similar to Fig. 4 but showing another embodiment of this invention. The absorbent member 3 of this diaper 1 is formed with, in addition to the first [groove] grooves 41 extending in the longitudinal direction, a pair of second [groove] grooves 46 extending in the transverse direction, i.e., orthogonally to the first [groove] grooves 41, between the transversely opposite side edge portions 29 of the absorbent member 3. These second [groove] grooves 46 facilitate the flow of air high in temperature and humidity to be exhausted from the first [groove] grooves 41 and thereby the air permeability of the absorbent member 3 is further improved. Preferably, one or more pieces of the second [groove] grooves 46 with substantially the same dimension as the first [groove] grooves 41 in width and depth may be installed against one piece of the first grooves 41.

The last paragraph beginning on page 11, continuing on page 12 and ending on page 13 has been amended as follows:

Fig. 8 is a view similar to Fig. 2 but showing still another embodiment of this invention, Fig. 9 is a sectional view taken along a line IX – IX in Fig. 2 and Fig. 10 is an enlarged sectional view showing a part of Fig. 9. The diaper 1 shown in Figs. 8 - 10 has, in addition to the first [groove] grooves 41 or both the first and second grooves 41, 46 formed on the side of the backsheet 36, [a] third [groove] grooves 47 formed on the side of the topsheet 36 so as to extend in the longitudinal direction. Preferably, the absorbent member 3 is formed on the side of the topsheet 36 with at least one [piece] portion of the third [groove] grooves 47 having an appropriate length and more preferably with at least two [pieces] portions of the third [groove] grooves 47 each being spaced in the longitudinal direction in the crotch region 8 of the cover member 2. Referring to Fig. 8, the absorbent member 3 is formed along each of its transversely opposite side edge portions 29 with a pair of the third [groove] grooves 47 spaced from each

other in the longitudinal direction. Taking account of the fact that the presence of the third [groove] grooves 47 tends to, in the same manner as the first [groove] grooves 41 in the embodiment shown by Fig. 4, restrain the absorbent member 3 from being easily curved between the front and rear end portions 26, 27, it is preferred to separate each of the third [groove] grooves 47 in the crotch region 8 so that the absorbent member 3 may be easily curved and thereby facilitated to fit to the wearer's crotch region. Each of the third [groove] grooves 47 preferably has a width of about 2 - 20 mm and a depth corresponding to about 1/4 - 3/4 of the thickness of the core 38. The third [groove] grooves 47 formed in this manner can reduce an amount of body fluids permeated sideways and prevent body fluids from leaking sideways of the diaper 1 by introducing body fluids such as urine to be guided thereinto.

The paragraph beginning on page 13 and continuing on page 14 has been amended as follows:

As is apparent from Fig. 10 showing the diaper 1 in the enlarged sectional view, the position of the third [groove] grooves 47 substantially conforms to the position of the first [groove] grooves 41 as viewed in the transverse direction of the diaper 1. With the first and third grooves 41, 47 formed on the side of the backsheet 37 and the side of the topsheet 36, respectively, in such an alignment, the absorbent member 3 is curved as indicated by imaginary lines and facilitated to follow a contour of the wearer's waist as the diaper 1 is worn. The first [groove] grooves 41 [is] are deformed with [its] their [width] widths are widened and the third [groove] grooves 47 [is] are deformed with [its] their widths are narrowed as the absorbent member 3 follows the contour of the wearer's waist in the waist-surrounding direction. Such deformation of the grooves 41, 47 advantageously facilitates the absorbent member 3 to follow the contour of the wearer's waist without formation of wrinkles on the side of the topsheet 36 even if the core 38 has a thickness of about 10 - 20 mm. Therefore, there is no anxiety that the

presence of the topsheet 36 might give the wearer an uncomfortable feeling. In this way, the first [groove] grooves 41 serving to improve the air permeability of the absorbent member 3 [is] are preferably positioned to that of the third [groove] grooves 47 so that the fitness of the absorbent member 3 around the wearer's waist also may be improved. More specifically, with the arrangement that the first [groove] grooves 41 and the third [groove] grooves 47 are positioned on the same position as illustrated in Fig. 10, it is preferred to dispose the core 38 between the first and third grooves 41, 47 so that the body fluids can be dispersed in the absorbent member 3 in the transverse direction through the core 38.

The paragraph beginning on page 14 and continuing on page 15 has been amended as follows:

While this invention has been described hereinabove with respect to the pants-type disposable diaper as the typical embodiment thereof, this invention is applicable also to an open-type disposable diaper. The cover member 2 may be formed [by] from a nonwoven fabric or plastic film, [both of which are preferably.] The core 38 of the absorbent member 3 may be formed [by a] from fluff pulp fibers 61 and superabsorbent polymer particles 62. The superabsorbent polymer particles 62 may be mixed with the fluff pulp fibers 61 and this mixture may be layered in the thickness direction of the core 38. The superabsorbent polymer particles 62 may be distributed with its density gradually increasing in the direction from the topsheet 36 toward the backsheet 37. The distribution density of the superabsorbent polymer particles 62 may be varied in the transverse direction of the absorbent member 3. For example, referring to Fig. 8, the distribution density of the superabsorbent polymer particles 62 may be adjusted to be higher in the zone defined between a pair of the third grooves 47, 47 than in the zones extending outside the pair of the third [groove] grooves 47, 47. In any case, an amount of the superabsorbent polymer particles 62 used to form the core 38 is preferably about 2 - 98 % by

weight of the core 38. Thermoplastic synthetic fiber having a melting point of  $100 \pm 20$  may be mixed into the core material up to 20 % by weight to facilitate formation of the first - third [groove] grooves 41, 46, 47 by heating the core 38 under a pressure.

The first full paragraph on page 15 has been amended as follows:

The disposable diaper according to this invention has the first [groove] grooves and the second [groove] grooves formed on the side of the backsheet of the absorbent member which is attached to the inner side of the cover member. The grooves contribute to improvement of air permeability of the absorbent member itself as well as to the air permeability desired between this absorbent member and the cover member so that no stuffiness may occur even when the absorbent member is closely contacted with the wearer's skin.

#### Changes Made to Claims

Claim 1 has been amended as follows:

1. (Amended) A disposable diaper comprising:

a cover member having front and rear waist regions and a crotch region; and

a body fluid absorbent member attached to an inner side of said cover member;

said body fluid absorbent member extending in a longitudinal direction across said crotch region into said front and rear waist regions, said body fluid absorbent member having front and rear end portions that are fixed to the inner surface of said cover member at said front and rear end portions thereof, [thereof; and]

said body fluid absorbent member [including,] including a liquid-pervious topsheet to be placed against a wearer's body, a backsheet to be placed against said inner surface of said cover member, and a body fluid absorbent core disposed between [these two sheets and] the liquid-pervious topsheet and said backsheet, said body fluid absorbent member being formed on

a side [of] facing said backsheet with [grooves] at least one groove that is concaved in a direction from said backsheet toward said topsheet, [ and extending in a predetermined.]

Claim 2 has been amended as follows:

2. (Amended) A disposable diaper according to claim 1, wherein said [grooves extend] at least one groove extends in at least one of said longitudinal direction of said diaper and a direction [being] orthogonal to said longitudinal direction.

Claim 3 has been amended as follows:

3. (Amended) The disposable diaper according to Claim 1, wherein said at least one groove comprises [a] at least one first [grooves] groove extending in said longitudinal direction across said crotch region into said front and rear waist regions and [a] at least one second groove extending in [said] a direction orthogonal to the [first groove] longitudinal direction so that said at least one first groove and said at least one second [grooves] groove intersect one another and said at least one second [grooves] groove extends to transversely opposite side edge portions of said body fluid absorbent member.

Claim 4 has been amended as follows:

4. (Amended) The disposable diaper according to Claim 1, wherein said body fluid absorbent member is formed on [the] a side [of] facing said topsheet with [a] at least one third groove that is concaved in a direction from said topsheet toward said backsheet and [extending] extends in said longitudinal direction across said crotch region into said front and rear trunk regions.



Claim 5 has been amended as follows:

5. (Amended) The disposable diaper according to Claim 4, wherein said at least one third groove is positioned to be substantially [in the same position as conformity to that of] aligned said at least one [first] groove.

Claim 6 has been amended as follows:

6. (Amended) The disposable diaper according to Claim 3, wherein said body absorbent core is disposed between said backsheet formed with said at least one first groove and said at least one second [grooves] groove and the topsheet opposed to said backsheet.

Claim 7 has been amended as follows:

7. (Amended) The disposable diaper according to Claim 4, wherein said body absorbent core is disposed between said topsheet formed with said at least one third groove and the backsheet opposed to said to topsheet.

Claim 8 remains unchanged.

#### Changes in the Abstract

The Abstract has been amended as follows:

The disposable diaper that includes a cover member and a body fluid absorbent member attached to an inner side of the cover member. The absorbent member is composed of a liquid-pervious topsheet, a backsheet and an absorbent core disposed therebetween. The core is formed on a side of the backsheet with [a] at least one first groove [concoved] concaved in a direction from the backsheet toward the topsheet.